

**UTILITY OF
NMP22 BLADDERCHEK POINT-OF-
CARE ASSAY
IN EVALUATION OF HEMATURIA:
A MULTICENTER STUDY**

Giora Katz M.D. Lakeshore Urology
manitowoc WI, and the NMP22
Clinical Investigation Group.*

**Author Disclosure
Matritech, Inc. : Honorarium**

Introduction

- Early diagnosis of bladder cancer saves lives
- Hematuria is the most common early sign of bladder cancer
- AUA guidelines for work up of hematuria for patients at risk include cystoscopy and urine cytology

Nuclear Matrix Protein and Transitional Cells of the Urinary Tract

- **Nuclear matrix proteins (NMP) make up the structural framework of the nucleus and coordinate its functions.**
- **NMP are cell type specific.**
- **NMP22 protein is specific for transitional cells in the urinary tract.**

Nuclear Matrix Protein in Normal and Malignant Transitional Cells

- Upon cell death NMP22 is released into the urine.
- Malignant transitional cells contain up to 80 times higher concentration of NMP22 protein than normal cells.
- Urine level of NMP22 protein ≥ 10 U / ml is associated with a high probability of TCC.
- Unlike cytological examination, detection of NMP22 is not dependent on recovery of intact cells.

Objectives

- 1. Investigate the utility of NMP22 “BladderChek” point-of-care test, as an adjunct to cystoscopy in detection of bladder cancer among patients with hematuria.**
- 2. Investigate the efficacy of NMP22 “BladderChek” point-of-care test, compared with voided urine cytology, as an adjunct to cystoscopy, in the detection of bladder cancer among patients with hematuria.**

Methods

Study Design and Execution

- Prospective, multi institutional study: 23 facilities in 10 states; Academic, private practice and VA.
- From September 2001 to May 2002, 1,331 patients scheduled for cystoscopy due to increased risk of bladder cancer. Of these, 1220 (91.3%) presented with hematuria and are the focus of this presentation.
- All patients provided a voided urine sample for analysis of NMP22 protein and cytology prior to diagnostic cystoscopy.

Methods

Study Design and Execution

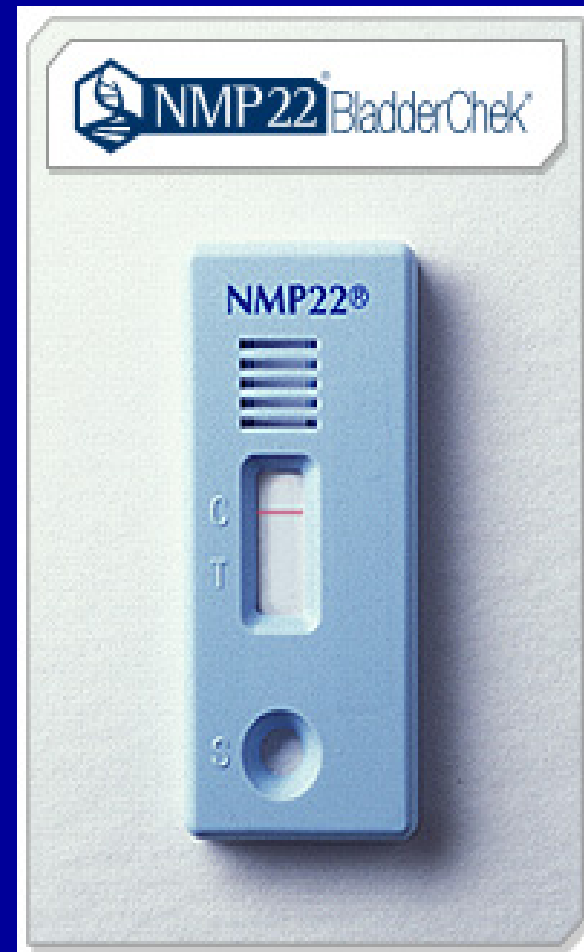
- Cytology was performed in-house or at a reference laboratory according to standard procedure of the participating clinic.
- Urologists were blinded to results of NMP22 test and cytology while performing and reporting the result of cystoscopy.
- TCC was diagnosed based on pathology report of excised tissue.

Methods

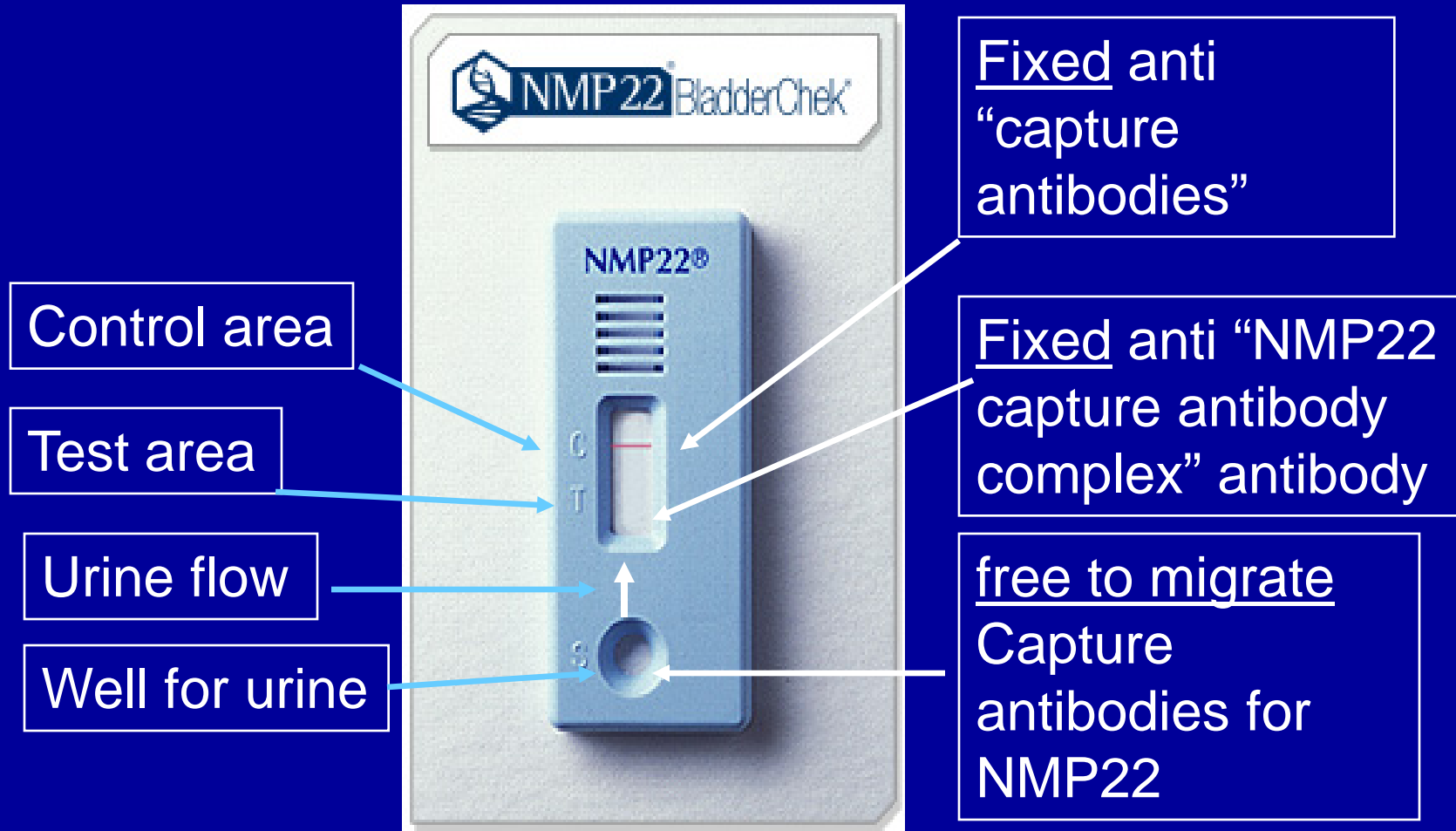
BladderChek Point-of-Care Device

Created to identify urinary NMP22 levels ≥ 10 U / ml.

- Can be performed by non-physician staff members (CLIA waived).
- Requires 4 drops of freshly voided urine.
- Results available in 30 minutes.
- Built-in quality control.



The Device



Positive

Negative

NMP22®

NMP22®

Control

C

C

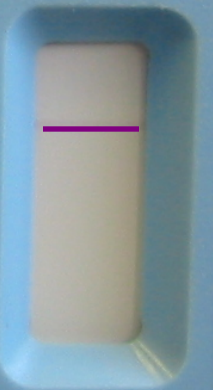
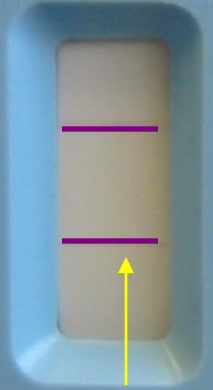
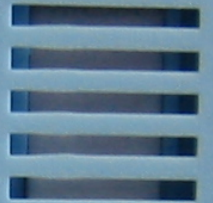
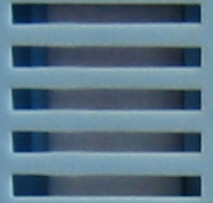
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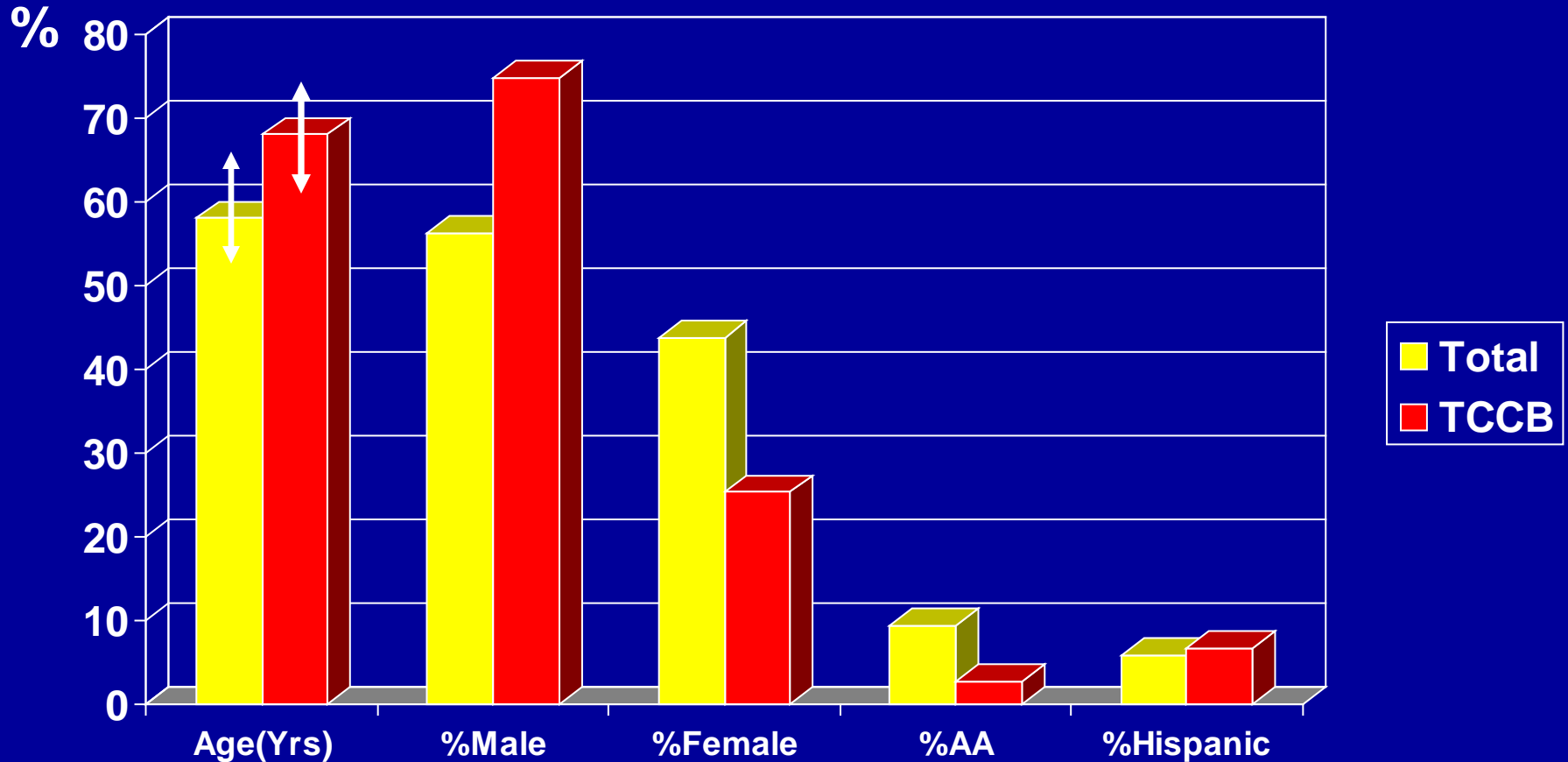
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Results

Tested Population with Hematuria TCC Dx in 75 out of 1220, 6.1%

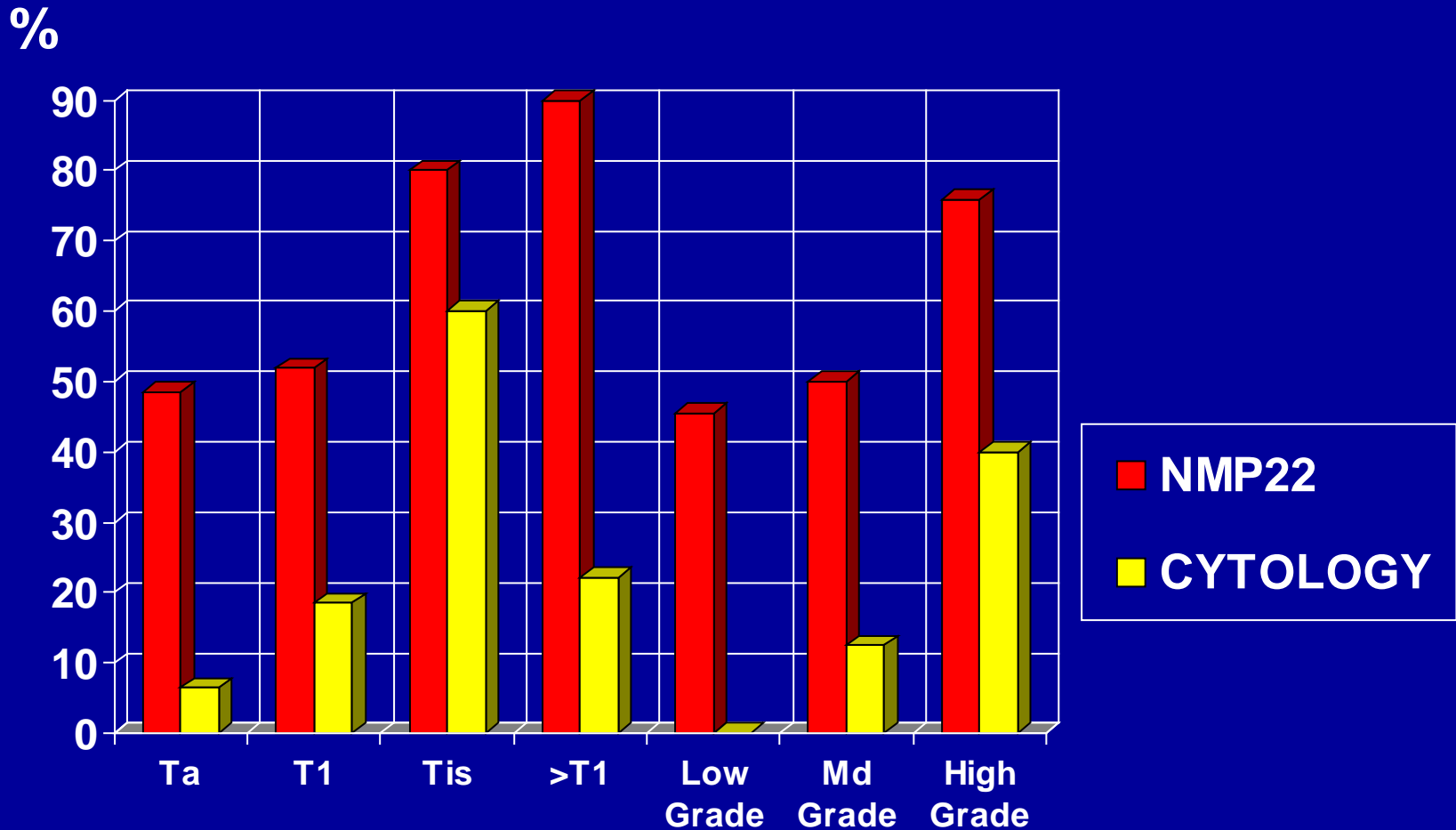


TCC 75* / 1,220 (6.1%)

*2 Tx patients not included in total

Results

Sensitivity of BladderChek Vs. Cytology in Detection of Bladder Cancer



Comparison Between BladderChek and Cytology in the Detection of Bladder Cancer Among Patients With Hematuria

	Muscle Invasive Cancers	Invasive Cancer T1 +	Superficial Cancers <T1
NMP22 BladderChek (75)*	90.0% (9/10)	62.2% (23/37)	52.6% (20/38)
Cytology (72)	22.2% (2/9)	19.4% (7/36)	13.9% (5/36)

Report of malignant or dysplastic cells considered positive

*2 patients had Tx, not included here

Cystoscopy Combined With NMP22 Vs. Cystoscopy Alone

Detection Method	Muscle Invasive Cancer Detected	All Cancer Detected
Cystoscopy COMBINED with NMP22 BladderChek	90.0% (9/10)*	93.3% (70/75)
Initial Cystoscopy Alone	60% (6/10)	88.0% (66/75)

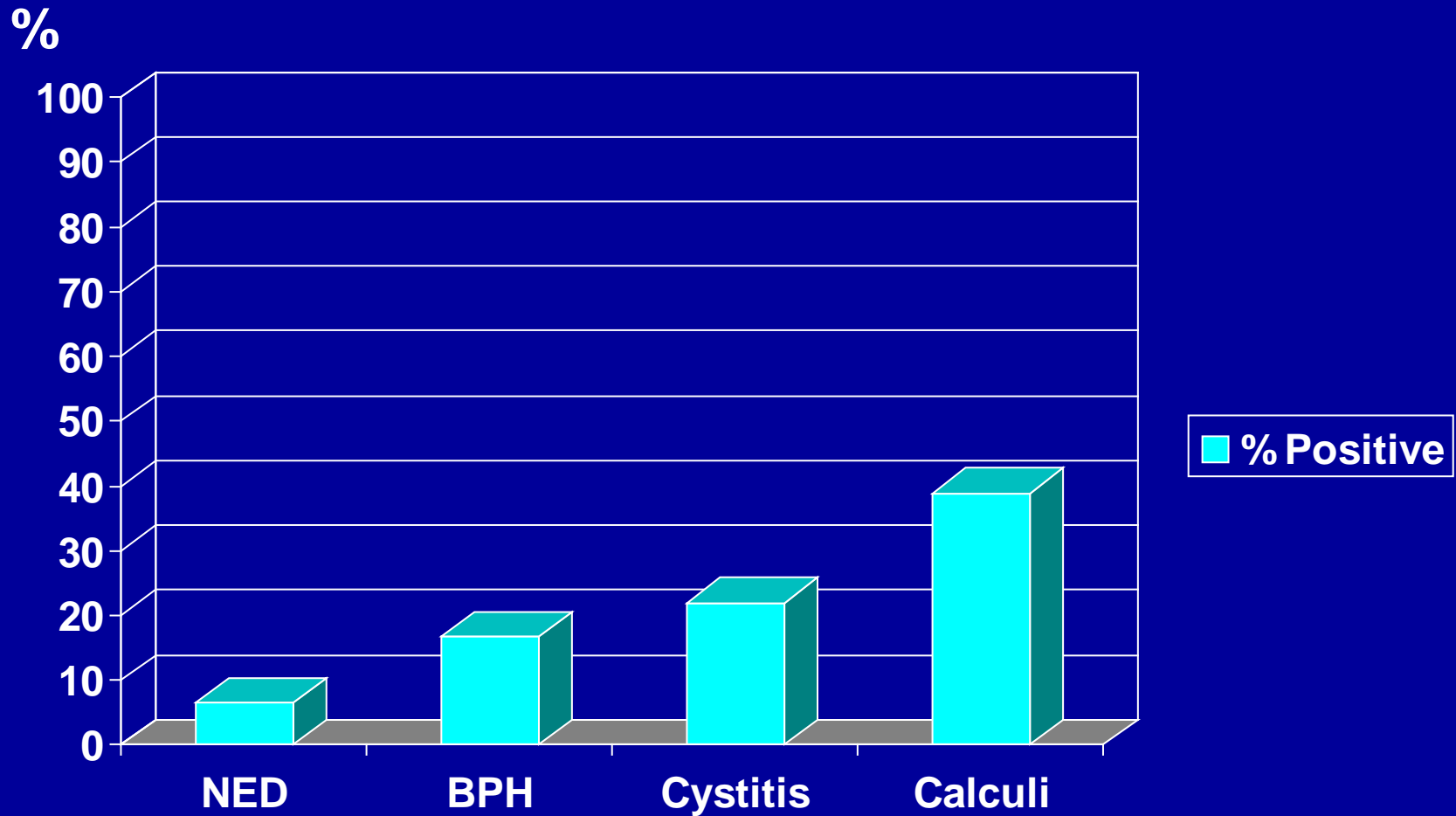
*Cancers positive by NMP22 test but not seen by cystoscopy:
Cis(1), Ureteral(1), Bladder(2)

**NMP22 Test also positive for 2 TCC's of the renal pelvis

NMP22 BladderChek and Cytology Specificity (FP)

	NMP22	Urine Cytology
No Cancer	85.7% (977/1140)	99.1% (1094/1104)
No GU Disease	93.5% (474/507)	99.4% (486/489)
Negative Predictive Value (FN)	96.8% (977/1009)	94.8% (1094/1154)

Positive NMP22 BladderChek Among Patients Diagnosed With Non Malignant GU Disease



Efficacy of NMP22 Vs Cytology In Workup of Hematuria

- NMP22 test is over 3x more sensitive than voided cytology (57.3% vs. 16.7%, $p < 0.001$)
- NMP22 test plus cystoscopy is significantly more sensitive than cystoscopy alone (93.3% vs. 88.0%, $p = 0.046$)

Conclusions

NMP22 BladderChek Utility

- Test can be performed in doctor's office with available clinical staff.
- Results in 30 minutes.
- Consistent with AUA guidelines recommending use of a urine test to back up cystoscopy.
- Half the cost of voided cytology.

Collaborating Investigators

H. Barton Grossman MD, M.D. Anderson Cancer Center, Houston, TX

Mark Soloway MD, University of Miami School of Medicine, Miami, FL

Kevin Tomera MD, Alaska Clinical Research Center, Anchorage, AK

Yitzhak Berger MD, Associates in Urology, West Orange, NJ

David Bock MD, Kansas City Urology Care, Kansas City, MO

Jeffrey Brady MD, Winter Park Urology Associates, Orlando, FL

M. Patrick Collini MD, Urology Associates of North Texas, Fort Worth, TX

Martin Dineen MD, Atlantic Urological Associates, Daytona Beach, FL

Vahan Kassabian MD, Georgia Urology, Atlanta, GA

Shiva Maralani MD, Michigan Urology, St. Clair Shores, MI

Raoul Salup MD, James A. Haley VA, Tampa, FL

Barry Stein MD, Rhode Island Hospital, Providence, RI

Alan Treiman MD, Urology Treatment Center, Sarasota, FL